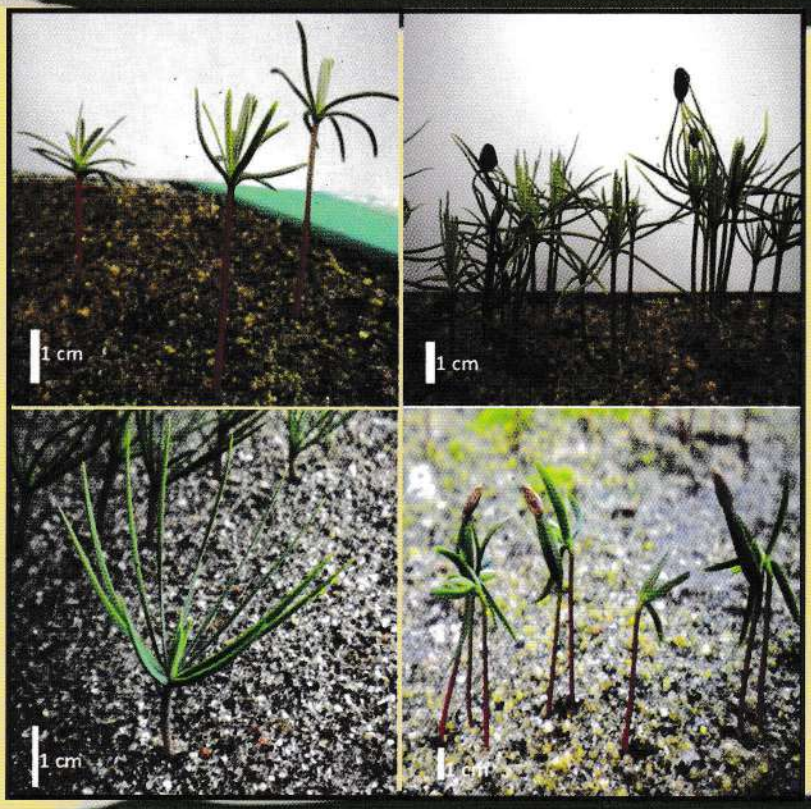
ISSN 0971 - 2976

Journal of the Botanical Society of Bengal



Volume 70
Number 2
December 2016

AN
OFFICIAL ORGAN
OF THE
BOTANICAL SOCIETY OF BENGAL

J. Botan. Soc. Bengal 70(2) December 2016 Registration No. RN 16610/67

JOURNAL OF THE BOTANICAL SOCIETY OF BENGAL
VOLUME 70 NUMBER 2 DECEMBER 2016

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Published bi-annualy by Prof. Subir Bera, Secretary, Botanical Society of Bengal, Department of Botany, University of Calcutta, Taraknath Palit Siksha Prangan, 35, Ballygunge Circular Road, Kolkata 700 019, India

J. Botan. Soc. Bengal 70 (2) : 145-151 (2016), ISSN 0971-2976

Seedling morphological investigation of four Indian taxa of Pinaceae

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Received : 30.11.2016 Accepted : 20.12.2016 Published : 30.12.2016

Study of seedling is emerging as a significant tool for taxonomic identification of flowering plants. Morphological studies of seedlings of Indian Gymnosperms have not been attempted earlier in a perspective to identify them at the juvenile stage. In this present study, an attempt is taken to investigate the seedlings of four conifer taxa belonging to family Pinaceae. The four taxa within the family can be distinguished on the basis of characters like number and nature of paracotyledons and nature of foliage leaves, among many others. These are serving as valid taxonomic markers and utilised for determining affinities between taxa.

Key words: Seedling morphology, Pinaceae, *Abies, Pinus, Tsuga,* identification, dendrogram, affinities.

INTRODUCTION

Pinaceae is the largest extant family in conifers (Farjon, 1998) with numerous economically and medicinally important plants. Four taxa from this family - *Abies densa* Griff., *Pinus patula* Schiede ex Schltdl. & Cham., *Pinus roxburghii* Sarg., *Tsuga dumosa* (D.Don) Eichler - have been investigated for their seedling morphology in this present study. *Abies densa* is an evergreen tree of about 40 to 60 mts in height. This species occurs at 8,000 to 12,000 ft of elevations in Eastern Himalayas. The needle leaves are flattened, more or less distichous in arrangement. The leaves are dark glaucous green on upper surface, with silvery white beneath. *Tsuga dumosa*, commonly known as Himalayan Hemlock, native to the Himalayas ranging from Uttarakhand to Arunachal Pradesh, is an evergreen tree and grows to a height of more than 60 feet, with an irregular pyramidal crown. The leaves are spirally arranged, linear, flattened with green, shiny upper surface and undersides having two wide silvery stomatal bands. *Pinus roxburghii* and *Pinus patula* are evergreen trees with needle leaves. *Pinus patula* is commonly known as Mexican weeping pine, with 3-4 needles leaves occuring in drooping tufts. *Pinus roxburghii*, known as Chir pine, occurs at 2,000 to 7,000 feet elevations in the Himalayas. This evergreen conifer usually bears leaves in fascicles of 3.

All the four species have some economic and medicinal uses and therefore have been investigated in many aspects. The morphology and anatomy of leaves of *Pinus* (Pinaceae) have been studied by Dorken *et al* (2012). Phytochemical studies (Naeem., 2010; Shuaib *et al*., 2013) and embryological studies (Arya *et al* , 2000., Malabadi *et al*., 2007) are reported in *Pinus roxburghii*. Antibacterial and antifungal activity (Chaudhary *et al*., 2012), analgesic and anti-inflammatory activities (Kaushik *et al*., 2012) and hepatoprotective activities of *P. roxburghii* (Khan *et al*., 2012) are reported. Somatic embryogenesis in *Pinus patula* is reported (Jones *et al*., 1993; Ford *et al*., 2000). *Pinus patula* have been investigated on

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